FIG.1

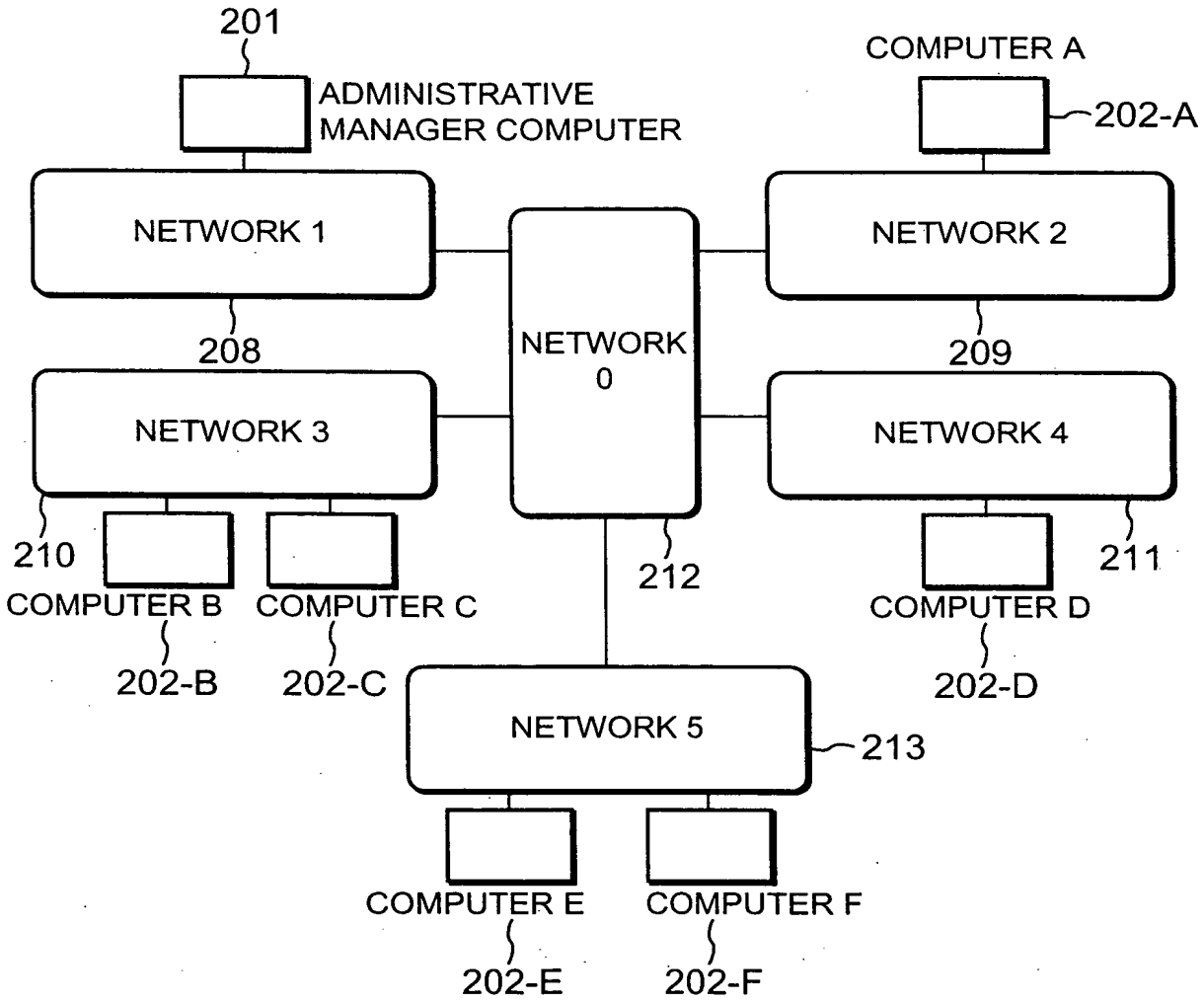

201
ADMINISTRATIVE MANAGER COMPUTER
COMPUTER A
202-A
NETWORK 1
NETWORK 2
NETWORK 0
208
209
NETWORK 3
NETWORK 4
210
211
212
COMPUTER B
COMPUTER C
COMPUTER D
202-B
202-C
202-D
NETWORK 5
213
COMPUTER E
COMPUTER F
202-E
202-F

FIG.2

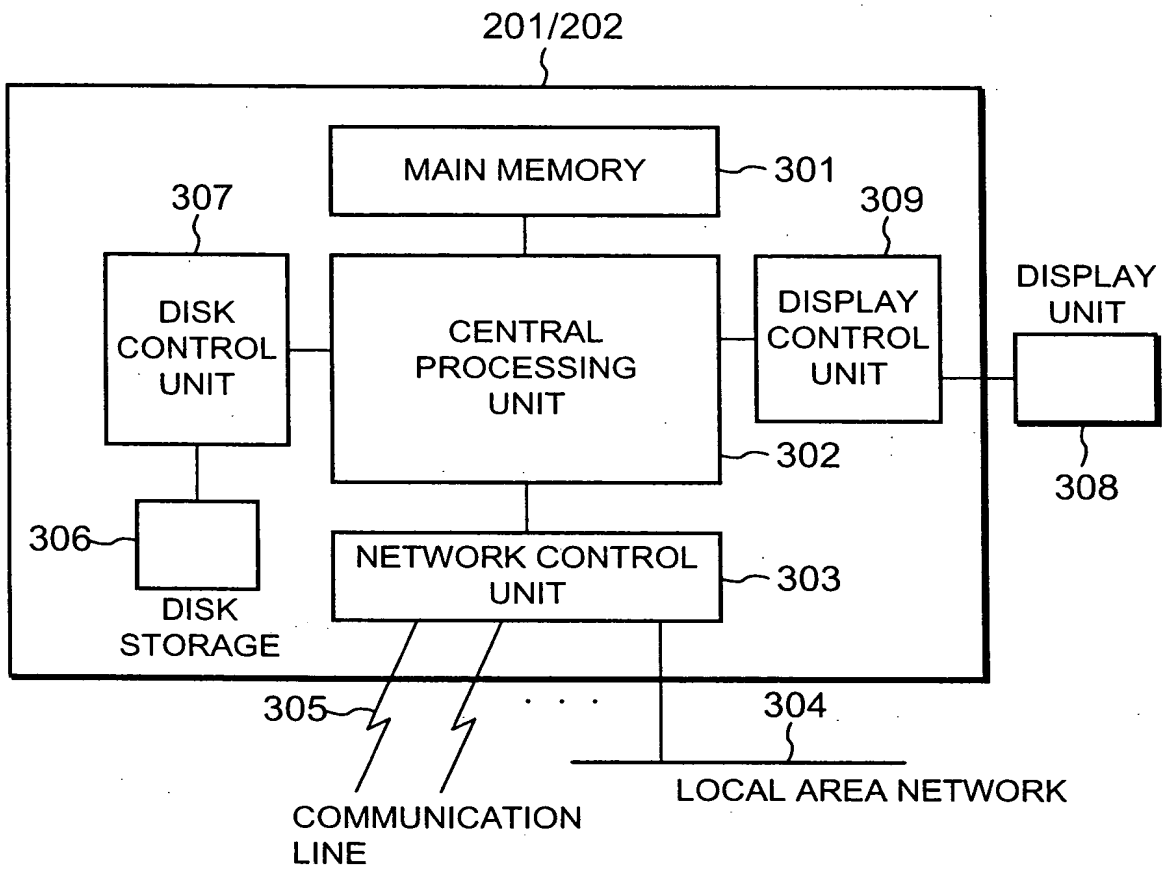
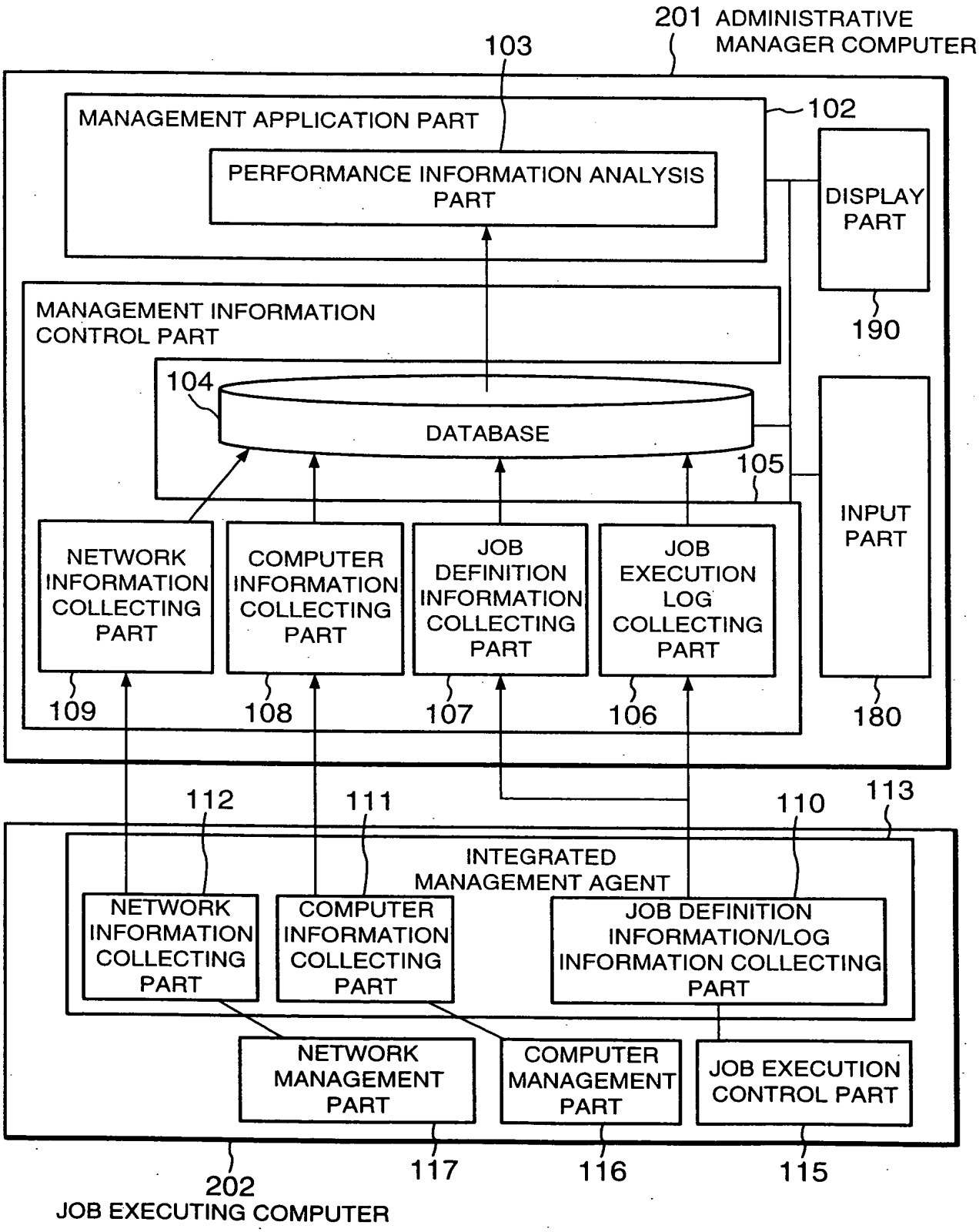

201/202
MAIN MEMORY
301
307
309
DISK CONTROL UNIT
CENTRAL PROCESSING UNIT
DISPLAY CONTROL UNIT
DISPLAY UNIT
302
308
306
NETWORK CONTROL UNIT
303
DISK STORAGE
305
304
LOCAL AREA NETWORK
COMMUNICATION LINE

FIG.3


201 ADMINISTRATIVE MANAGER COMPUTER
103
MANAGEMENT APPLICATION PART
102
PERFORMANCE INFORMATION ANALYSIS PART
DISPLAY PART
190
MANAGEMENT INFORMATION CONTROL PART
104
DATABASE
105
INPUT PART
NETWORK INFORMATION COLLECTING PART
COMPUTER INFORMATION COLLECTING PART
JOB DEFINITION INFORMATION COLLECTING PART
JOB EXECUTION LOG COLLECTING PART
109
108
107
106
180
112
111
110
113
INTEGRATED MANAGEMENT AGENT
NETWORK INFORMATION COLLECTING PART
COMPUTER INFORMATION COLLECTING PART
JOB DEFINITION INFORMATION/LOG INFORMATION COLLECTING PART
NETWORK MANAGEMENT PART
COMPUTER MANAGEMENT PART
JOB EXECUTION CONTROL PART
117
116
115
202
JOB EXECUTING COMPUTER

JOB NET DEFINITIONS

FIG.4A

OPERATIONAL DEFINITION IDENTIFIER	JOB NET NAME	STARTING DAY OF THE WEEK/ STARTING DAY	START TIME	COMPONENT JOBS DEFINITION
1101	JOB NET A	MONDAY - FRIDAY	9:30	JOB 1, {JOB 2, JOB 3}, JOB 4, JOB 5
1102	JOB NET B	MONDAY - FRIDAY	10:30	JOB 1, JOB 2, JOB 3

FIG.4B

DEFINITION OF EACH JOB CONSTITUTING A JOB NET

JOB NET A

JOB NAME	PLANNED START TIME	PLANNED END TIME	OPERATIONAL DEFINITION IDENTIFIER	COMPUTER NAME	ALTERNATIVE CANDIDATE NAME	EXECUTABLE FILE NAME	PORT NUMBER
JOB 1	9:30	10:00	1101-1	COMPUTER A	COMPUTER E	abc1.exe	2001
JOB 2	10:00	10:30	1101-2	COMPUTER B	COMPUTER F	abc2.exe	2002
JOB 3	10:00	10:30	1101-3	COMPUTER C	—	abc3.exe	2003
JOB 4	10:30	11:00	1101-4	COMPUTER D	—	abc4.exe	2004
JOB 5	11:30	12:30	1101-5	COMPUTER E	COMPUTER A	abc5.exe	2005

JOB NET B

JOB NAME	PLANNED START TIME	PLANNED END TIME	OPERATIONAL DEFINITION IDENTIFIER	COMPUTER NAME	ALTERNATIVE CANDIDATE NAME	EXECUTABLE FILE NAME	PORT NUMBER
JOB 1	10:00	10:30	1102-1	COMPUTER B	COMPUTER F	def1.exe	3001
JOB 2	10:30	11:00	1102-2	COMPUTER E	COMPUTER A	def2.exe	3002
JOB 3	11:00	11:30	1102-3	COMPUTER C	COMPUTER D	def3.exe	3003

FIG.5

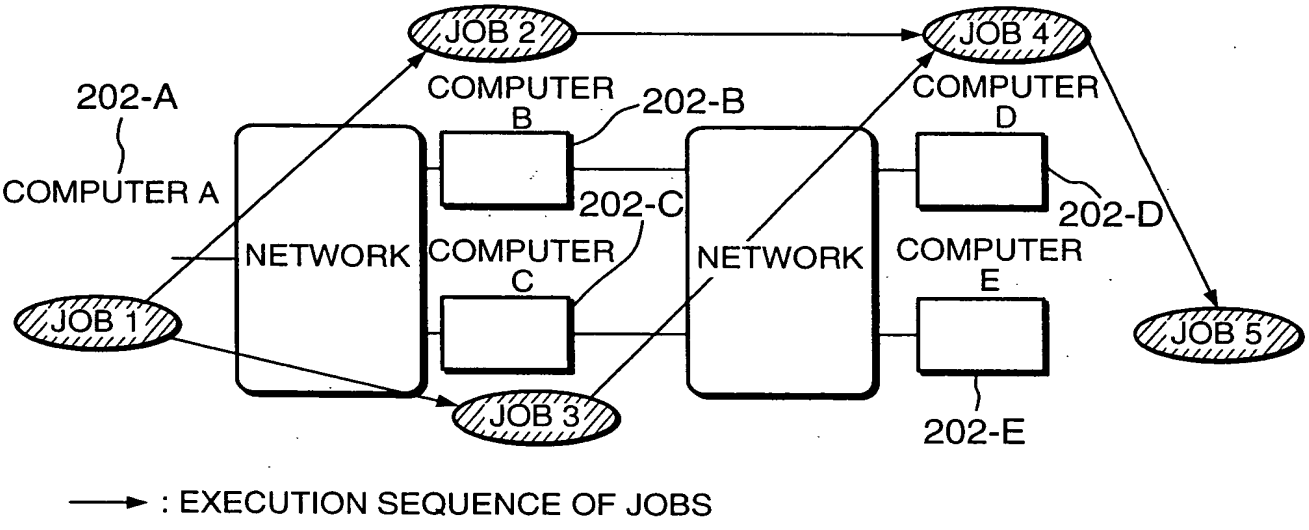

JOB 2
JOB 4
202-A
COMPUTER B
202-B
COMPUTER D
COMPUTER A
202-C
202-D
NETWORK
COMPUTER C
NETWORK
COMPUTER E
JOB 1
JOB 5
JOB 3
202-E
: EXECUTION SEQUENCE OF JOBS

FIG.6

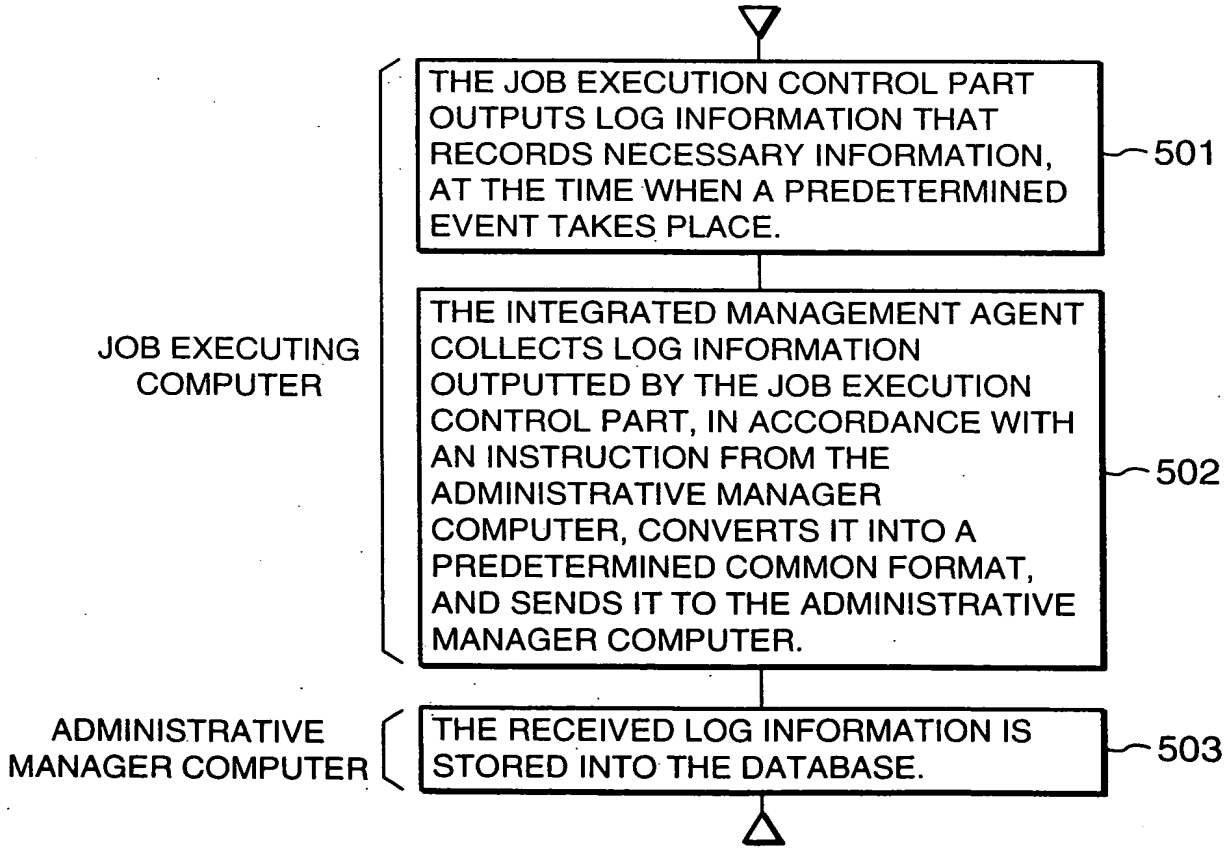

JOB EXECUTING COMPUTER
THE JOB EXECUTION CONTROL PART OUTPUTS LOG INFORMATION THAT RECORDS NECESSARY INFORMATION, AT THE TIME WHEN A PREDETERMINED EVENT TAKES PLACE.
501
THE INTEGRATED MANAGEMENT AGENT COLLECTS LOG INFORMATION OUTPUTTED BY THE JOB EXECUTION CONTROL PART, IN ACCORDANCE WITH AN INSTRUCTION FROM THE ADMINISTRATIVE MANAGER COMPUTER, CONVERTS IT INTO A PREDETERMINED COMMON FORMAT, AND SENDS IT TO THE ADMINISTRATIVE MANAGER COMPUTER.
502
ADMINISTRATIVE MANAGER COMPUTER
THE RECEIVED LOG INFORMATION IS STORED INTO THE DATABASE.
503

FIG.7

LOG INFORMATION 1301

EVENT LOG IDENTIFIER	COMPUTER NAME	TIME	EVENT LOG CLASS	OPERATIONAL DEFINITION IDENTIFIER	DETAILED INFORMATION
1001	COMPUTER A	6/16 9:30	START OF JOB NET A	1101	NORMAL START-UP
1002	COMPUTER A	6/16 9:30	START OF JOB NET A - JOB 1	1101-1	NORMAL START-UP
1003	COMPUTER A	6/16 10:00	END OF JOB NET A - JOB 1	1101-1	NORMAL END
1002	COMPUTER B	6/16 10:00	START OF JOB NET A - JOB 2	1101-2	NORMAL START-UP
1003	COMPUTER B	6/16 10:34	END OF JOB NET A - JOB 2	1101-2	NORMAL END
1002	COMPUTER C	6/16 10:00	START OF JOB NET A - JOB 3	1101-3	NORMAL START-UP
1003	COMPUTER C	6/16 10:30	END OF JOB NET A - JOB 3	1101-3	NORMAL END
1002	COMPUTER D	6/16 10:39	START OF JOB NET A - JOB 4	1101-2	NORMAL START-UP
1003	COMPUTER D	6/16 11:09	END OF JOB NET A - JOB 4	1101-2	NORMAL END
1002	COMPUTER E	6/16 11:09	START OF JOB NET A - JOB 5	1101-2	NORMAL START-UP
1003	COMPUTER E	6/16 11:40	END OF JOB NET A - JOB 5	1101-2	NORMAL END

FIG.8

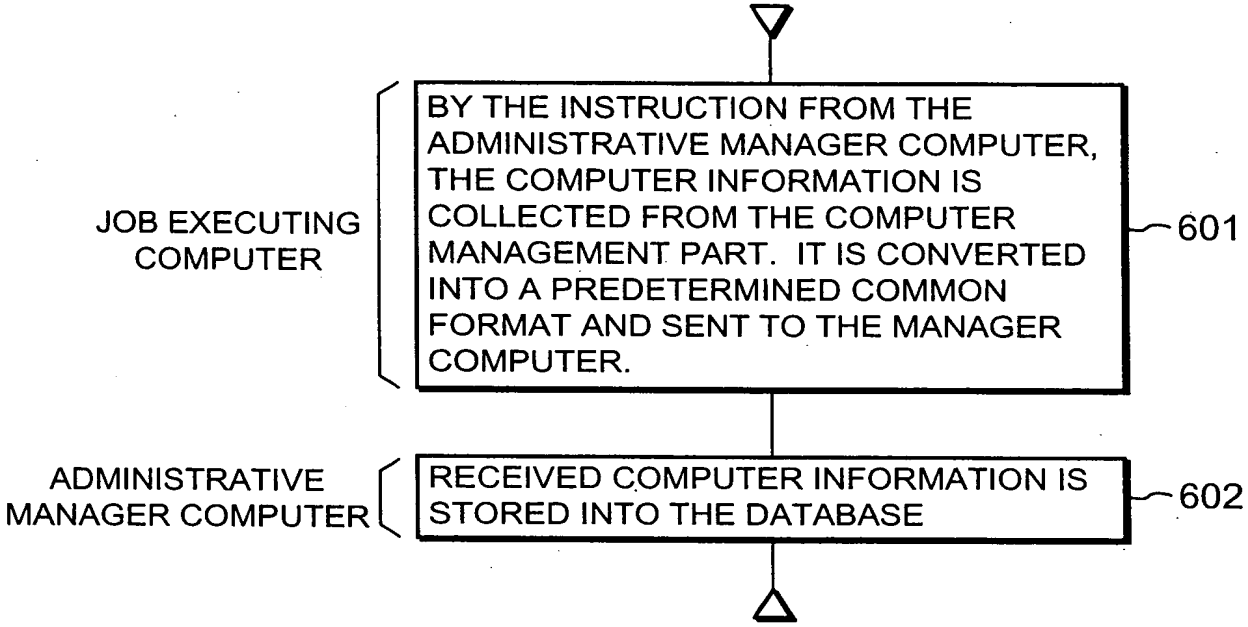

JOB EXECUTING COMPUTER
BY THE INSTRUCTION FROM THE ADMINISTRATIVE MANAGER COMPUTER, THE COMPUTER INFORMATION IS COLLECTED FROM THE COMPUTER MANAGEMENT PART. IT IS CONVERTED INTO A PREDETERMINED COMMON FORMAT AND SENT TO THE MANAGER COMPUTER.
601
ADMINISTRATIVE MANAGER COMPUTER
RECEIVED COMPUTER INFORMATION IS STORED INTO THE DATABASE
602

FIG.9

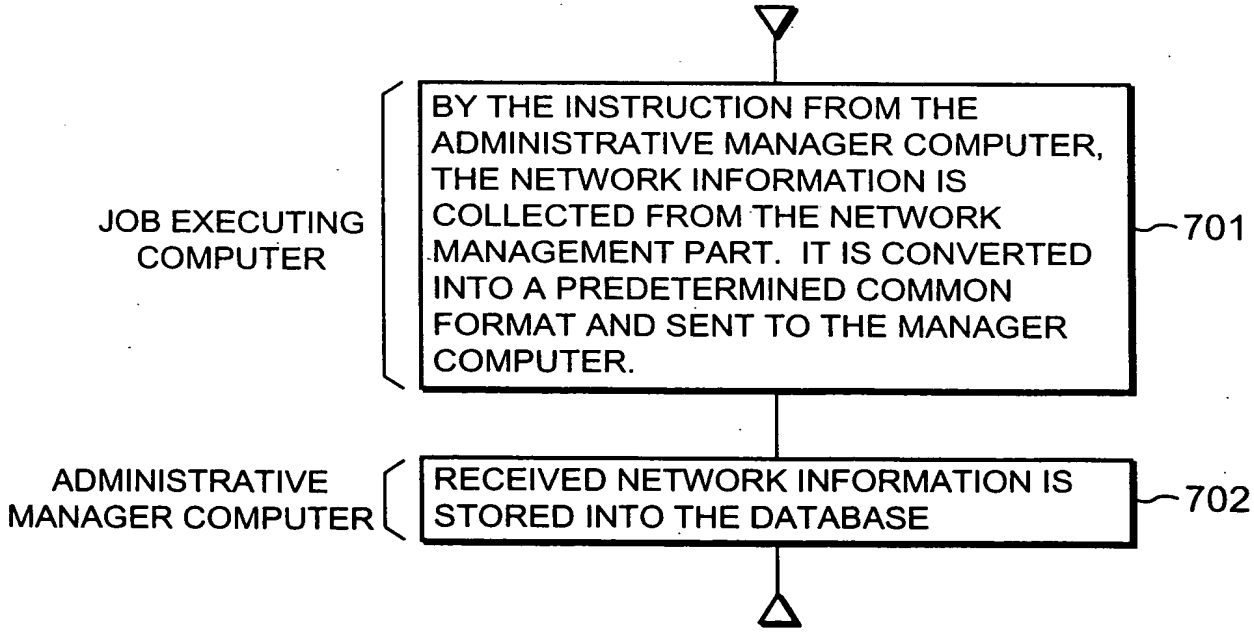

JOB EXECUTING COMPUTER
BY THE INSTRUCTION FROM THE ADMINISTRATIVE MANAGER COMPUTER, THE NETWORK INFORMATION IS COLLECTED FROM THE NETWORK MANAGEMENT PART. IT IS CONVERTED INTO A PREDETERMINED COMMON FORMAT AND SENT TO THE MANAGER COMPUTER.
701
ADMINISTRATIVE MANAGER COMPUTER
RECEIVED NETWORK INFORMATION IS STORED INTO THE DATABASE
702

FIG.10

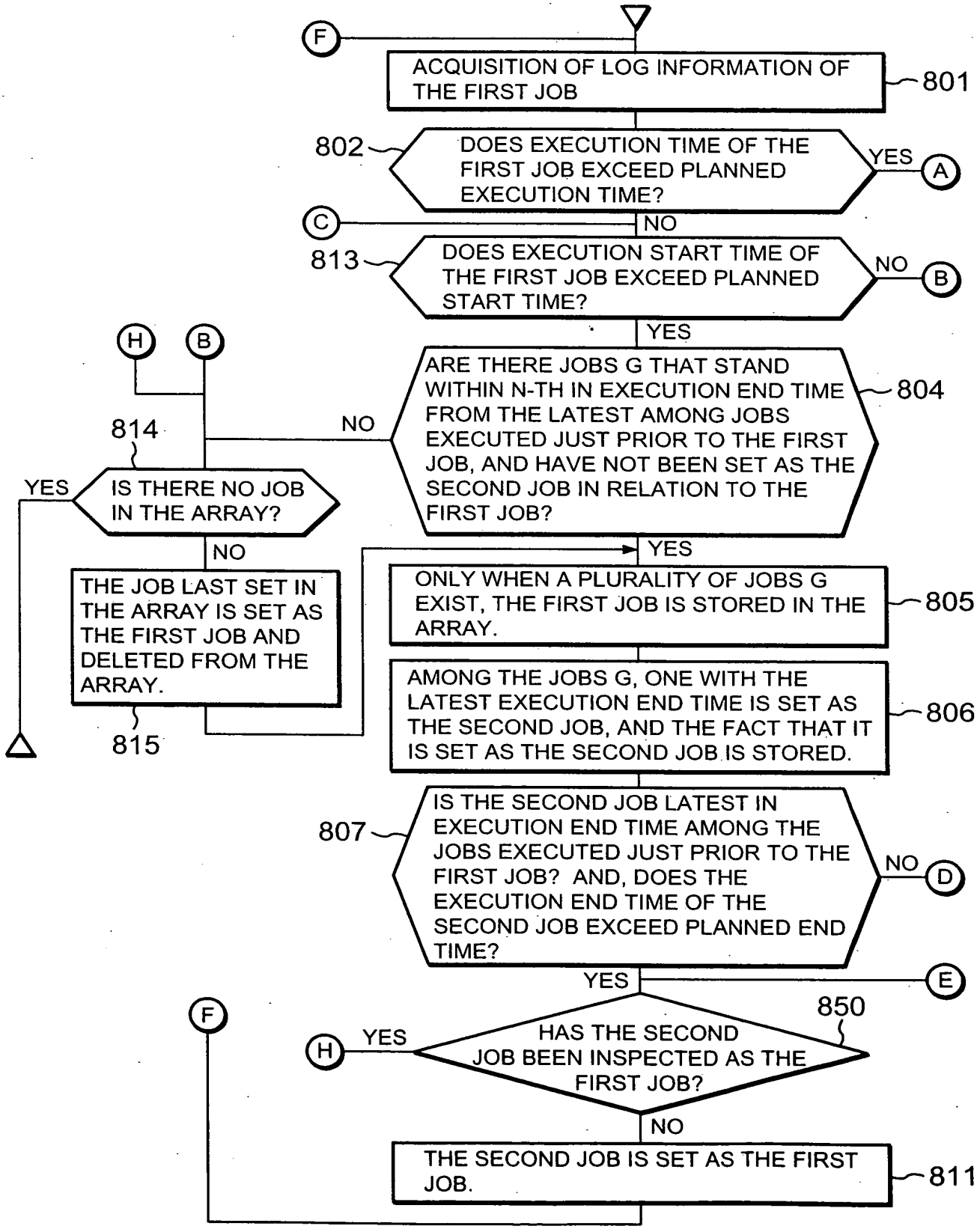

F
ACQUISITION OF LOG INFORMATION OF THE FIRST JOB
801
802
DOES EXECUTION TIME OF THE FIRST JOB EXCEED PLANNED EXECUTION TIME?
YES
A
C
NO
813
DOES EXECUTION START TIME OF THE FIRST JOB EXCEED PLANNED START TIME?
NO
B
YES
H
B
814
NO
ARE THERE JOBS G THAT STAND WITHIN N-TH IN EXECUTION END TIME FROM THE LATEST AMONG JOBS EXECUTED JUST PRIOR TO THE FIRST JOB, AND HAVE NOT BEEN SET AS THE SECOND JOB IN RELATION TO THE FIRST JOB?
804
YES
IS THERE NO JOB IN THE ARRAY?
YES
NO
YES
ONLY WHEN A PLURALITY OF JOBS G EXIST, THE FIRST JOB IS STORED IN THE ARRAY.
805
THE JOB LAST SET IN THE ARRAY IS SET AS THE FIRST JOB AND DELETED FROM THE ARRAY.
AMONG THE JOBS G, ONE WITH THE LATEST EXECUTION END TIME IS SET AS THE SECOND JOB, AND THE FACT THAT IT IS SET AS THE SECOND JOB IS STORED.
806
815
807
IS THE SECOND JOB LATEST IN EXECUTION END TIME AMONG THE JOBS EXECUTED JUST PRIOR TO THE FIRST JOB? AND, DOES THE EXECUTION END TIME OF THE SECOND JOB EXCEED PLANNED END TIME?
NO
D
YES
E
F
850
H
YES
HAS THE SECOND JOB BEEN INSPECTED AS THE FIRST JOB?
NO
THE SECOND JOB IS SET AS THE FIRST JOB.
811

FIG.11

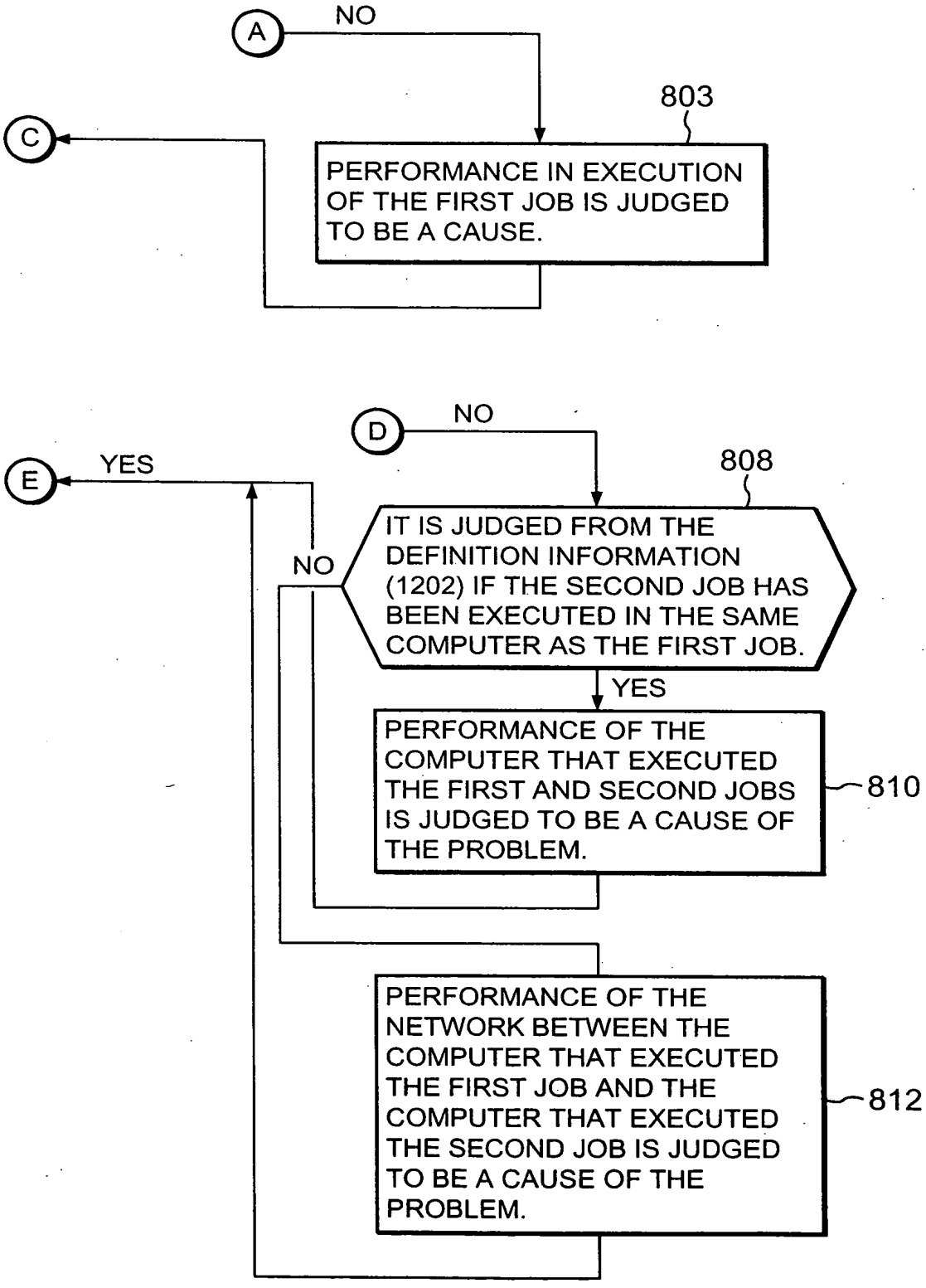

A
NO
803
C
PERFORMANCE IN EXECUTION OF THE FIRST JOB IS JUDGED TO BE A CAUSE.
D
NO
808
E
YES
NO
IT IS JUDGED FROM THE DEFINITION INFORMATION (1202) IF THE SECOND JOB HAS BEEN EXECUTED IN THE SAME COMPUTER AS THE FIRST JOB.
YES
PERFORMANCE OF THE COMPUTER THAT EXECUTED THE FIRST AND SECOND JOBS IS JUDGED TO BE A CAUSE OF THE PROBLEM.
810
PERFORMANCE OF THE NETWORK BETWEEN THE COMPUTER THAT EXECUTED THE FIRST JOB AND THE COMPUTER THAT EXECUTED THE SECOND JOB IS JUDGED TO BE A CAUSE OF THE PROBLEM.
812

FIG.12A

901

FAULT MONITORING SCREEN

IMPORTANCE	DATE	TIME	SOURCE OF NOTIFICATION	MESSAGE
NORMAL	97/6/19	9:02:20	COMPUTER A	POWER IS TURNED ON.
NORMAL	97/6/19	9:30:00	COMPUTER A	JOB NET A IS STARTED.
NORMAL	97/6/19	11:40:00	COMPUTER E	JOB NET A IS ENDED.
ERROR	97/6/19	9:13:30	MANAGER COMPUTER	EXECUTION DELAY OF JOB NET A IS DETECTED.

902

FIG.12B

903

DETAIL OF ANALYSIS RESULT

IMPORTANCE	DATE	TIME	COMPUTER	JOB/JOB NET NAMES	DELAY TIME	CUMULATIVE DELAY TIME	DELAY SOURCE
NORMAL	97/6/19	9:30:00	COMPUTER A	JOB NET A - JOB 1	0	0	...
ERROR	97/6/19	10:00:00	COMPUTER B	JOB NET A - JOB 2	4	4	COMPUTER
NORMAL	97/6/19	10:00:00	COMPUTER C	JOB NET A - JOB 3	0	0	...
ERROR	97/6/19	10:39:00	COMPUTER D	JOB NET A - JOB 4	5	9	NETWORK
NORMAL	97/6/19	11:09:00	COMPUTER E	JOB NET A - JOB 5	1	10	COMPUTER

FIG.13A

DISPLAY EXAMPLE: JOB 4 IS A CAUSE OF DELAY
(JOB 4 IS HIGHLIGHTED)

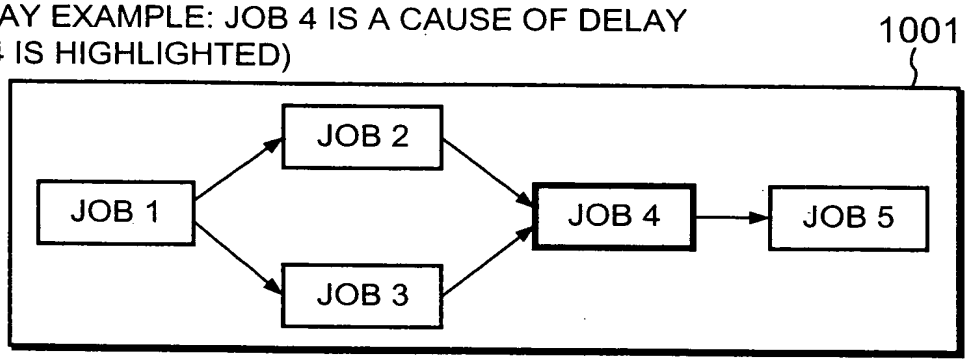


FIG.13B

DISPLAY EXAMPLE OF CONFIGURATION OF COMPUTERS
(COMPUTER IN EXECUTION OF JOB 4 IS HIGHLIGHTED)

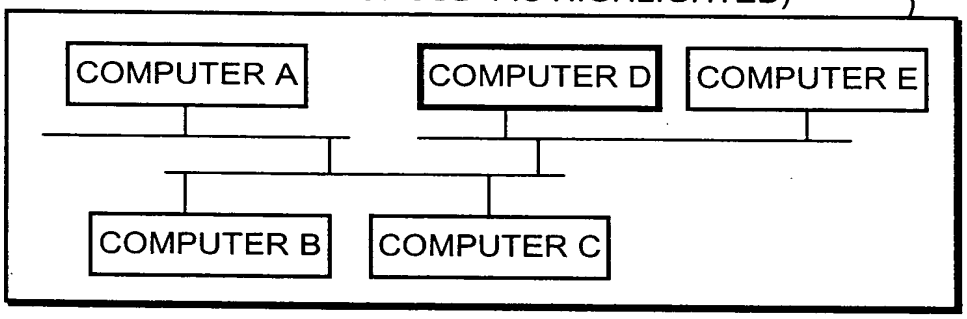


FIG.13C

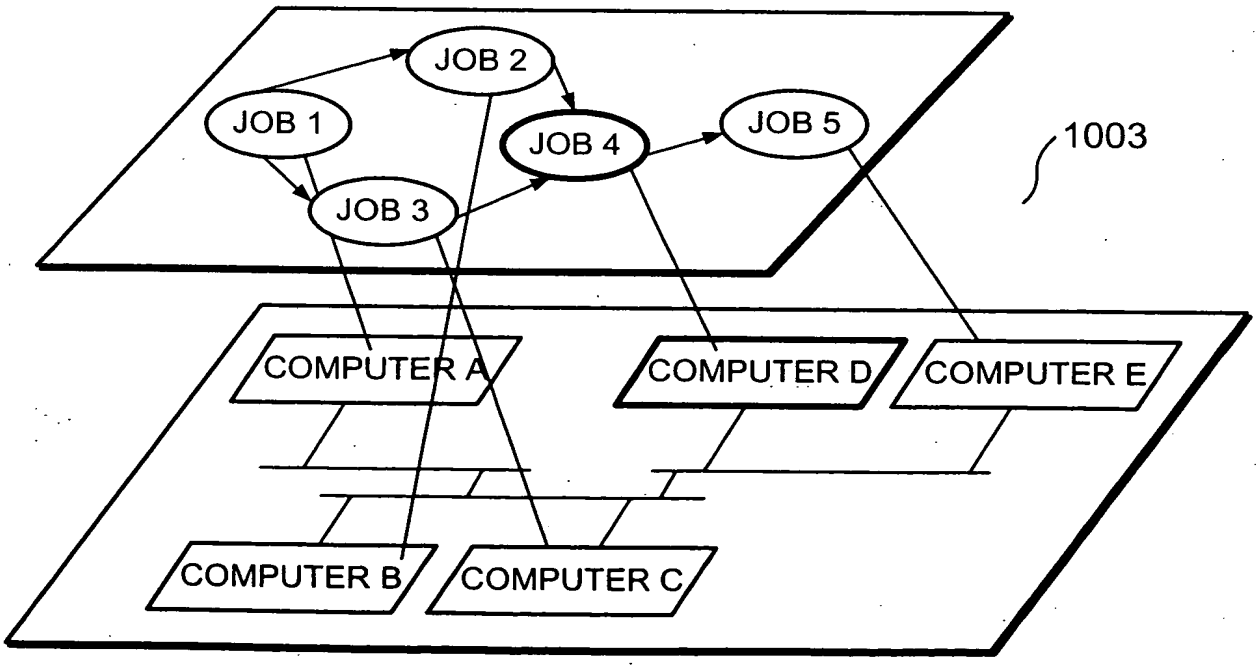


FIG.14A

DISPLAY EXAMPLE: TRANSFER BETWEEN JOB 2 AND JOB 4 IS A CAUSE OF DELAY

1101

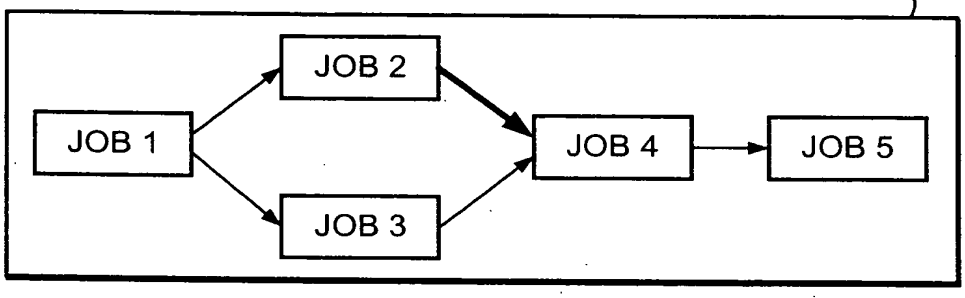


FIG.14B

DISPLAY EXAMPLE OF CONFIGURATION OF COMPUTERS (COMPUTER B IN EXECUTION OF JOB 2 AND COMPUTER D IN EXECUTION OF JOB 4 ARE HIGHLIGHTED)

1102

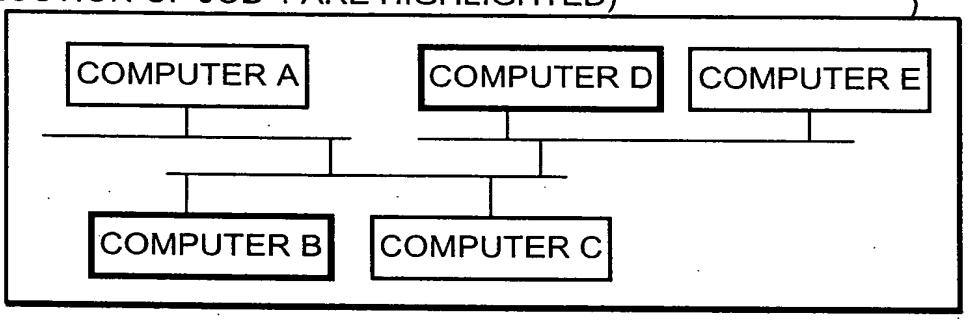


FIG.14C

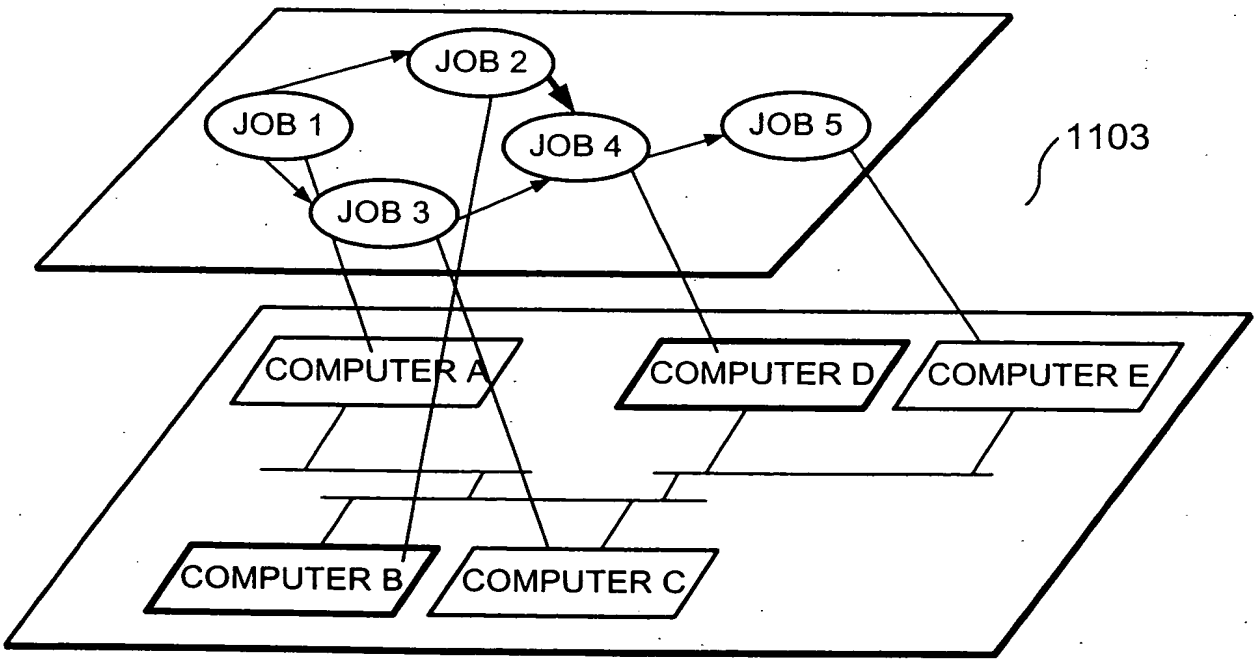
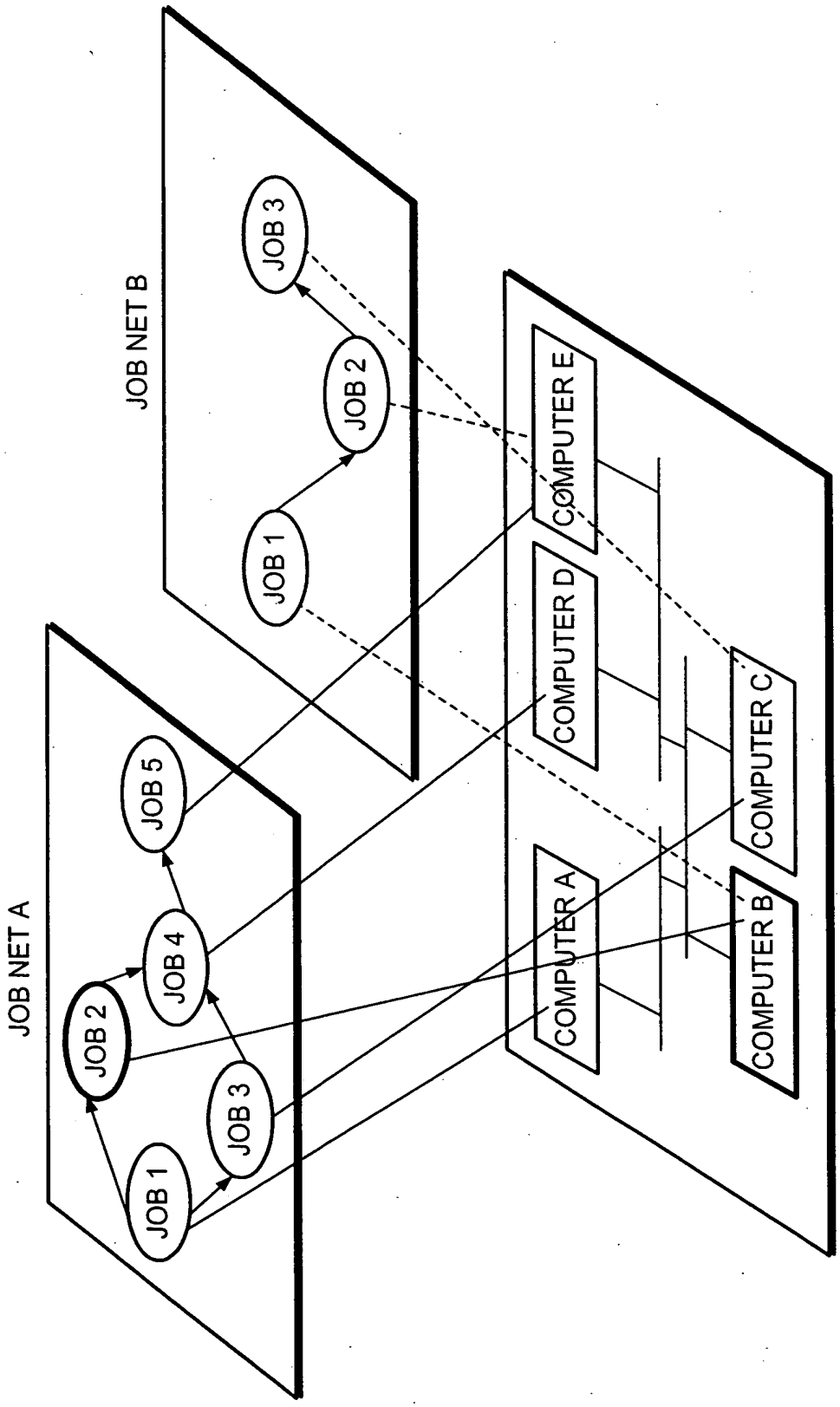


FIG.15



JOB 2 OF JOB NET A AND JOB 1 OF JOB NET B ARE EXECUTED IN PARALLEL IN COMPUTER B.
→ LOAD OF COMPUTER B IS PRESSED.

FIG.16

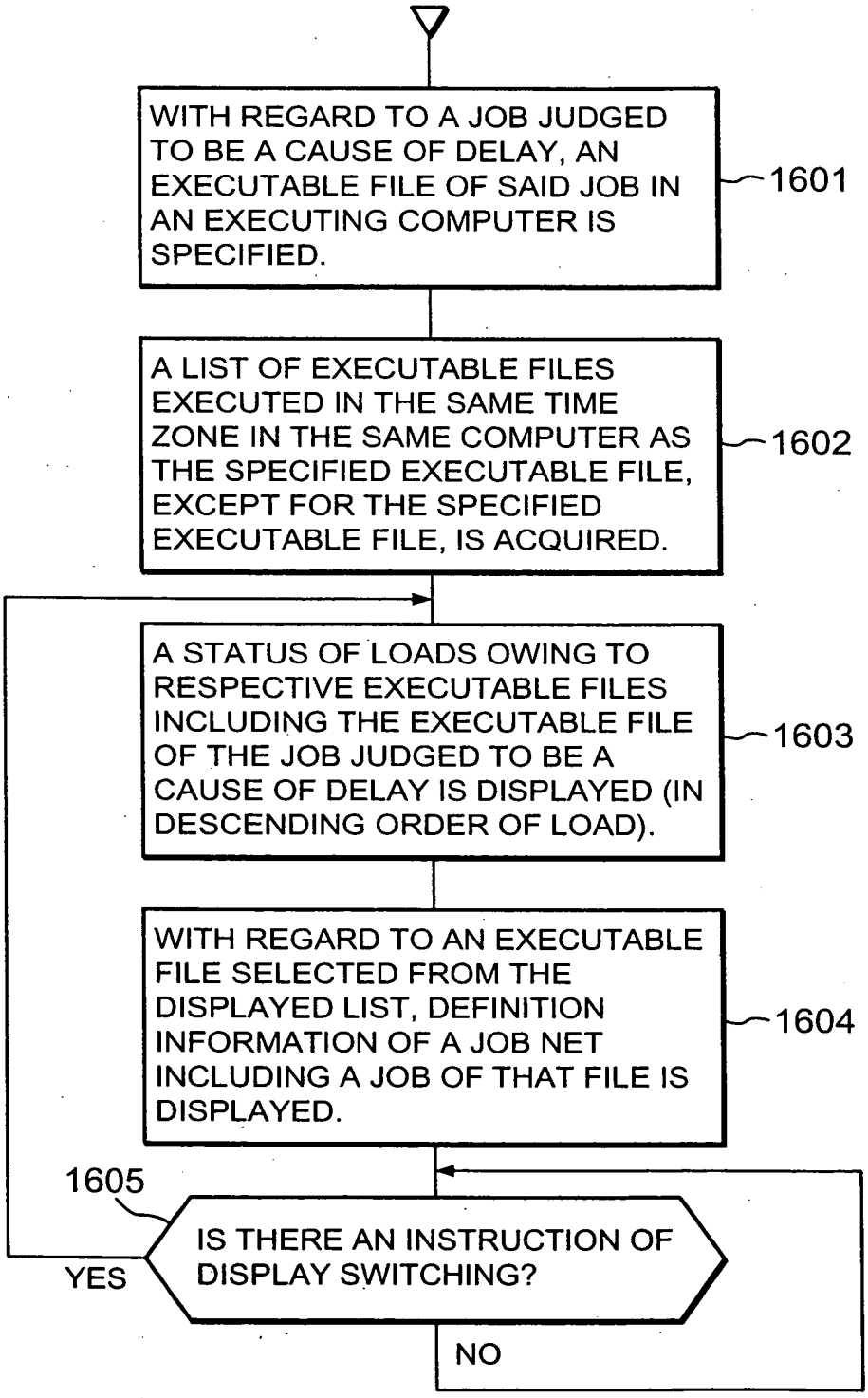

WITH REGARD TO A JOB JUDGED TO BE A CAUSE OF DELAY, AN EXECUTABLE FILE OF SAID JOB IN AN EXECUTING COMPUTER IS SPECIFIED.
1601
A LIST OF EXECUTABLE FILES EXECUTED IN THE SAME TIME ZONE IN THE SAME COMPUTER AS THE SPECIFIED EXECUTABLE FILE, EXCEPT FOR THE SPECIFIED EXECUTABLE FILE, IS ACQUIRED.
1602
A STATUS OF LOADS OWING TO RESPECTIVE EXECUTABLE FILES INCLUDING THE EXECUTABLE FILE OF THE JOB JUDGED TO BE A CAUSE OF DELAY IS DISPLAYED (IN DESCENDING ORDER OF LOAD).
1603
WITH REGARD TO AN EXECUTABLE FILE SELECTED FROM THE DISPLAYED LIST, DEFINITION INFORMATION OF A JOB NET INCLUDING A JOB OF THAT FILE IS DISPLAYED.
1604
1605
IS THERE AN INSTRUCTION OF DISPLAY SWITCHING?
YES
NO

FIG.17

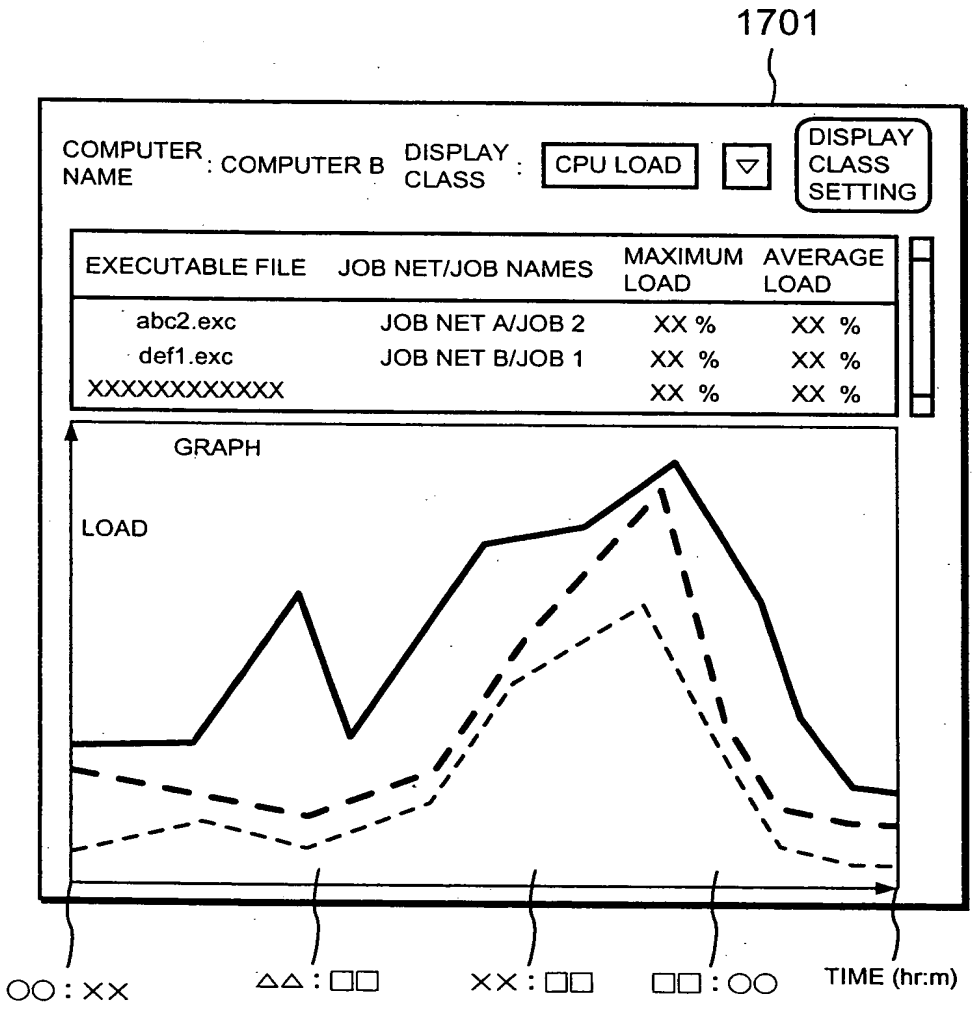

1701
COMPUTER NAME
: COMPUTER B
DISPLAY CLASS
:
CPU LOAD
DISPLAY CLASS SETTING
EXECUTABLE FILE
JOB NET/JOB NAMES
MAXIMUM LOAD
AVERAGE LOAD
abc2.exc
JOB NET A/JOB 2
XX %
XX %
def1.exc
JOB NET B/JOB 1
XX %
XX %
XXXXXXXXXXXX
XX %
XX %
GRAPH
LOAD
○○ : ××
△△ : □□
×× : □□
□□ : ○○
TIME (hr:m)
: WHOLE
: JOB NET A/JOB 2
: JOB NET B/JOB 1

FIG.18

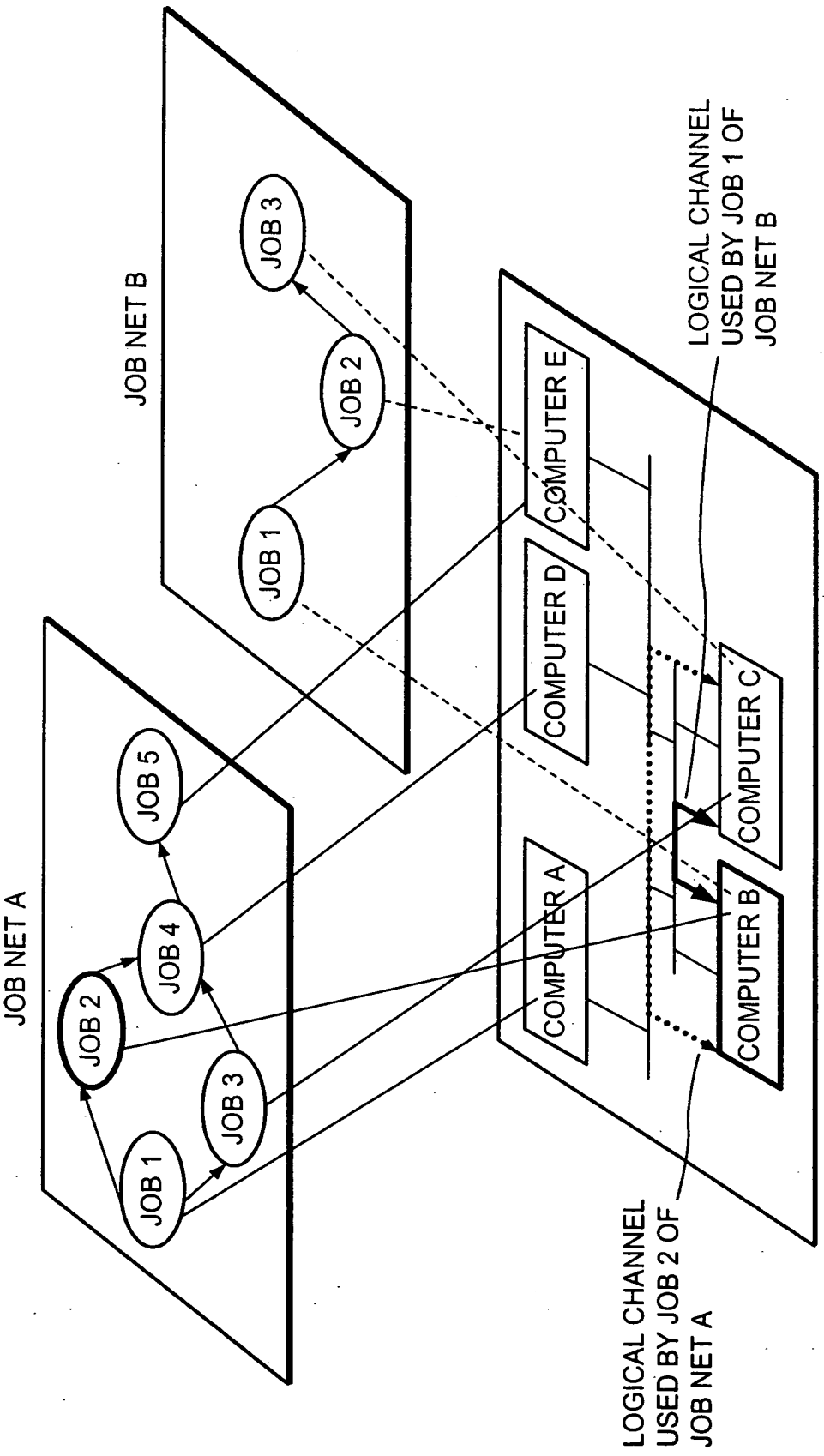

JOB NET A
JOB 1
JOB 2
JOB 3
JOB 4
JOB 5
JOB NET B
JOB 1
JOB 2
JOB 3
COMPUTER A
COMPUTER B
COMPUTER C
COMPUTER D
COMPUTER E
LOGICAL CHANNEL USED BY JOB 2 OF JOB NET A
LOGICAL CHANNEL USED BY JOB 1 OF JOB NET B
JOB 2 OF JOB NET A AND JOB 1 OF JOB NET B ARE EXECUTED IN PARALLEL IN COMPUTER B.
→ LOGICAL CHANNEL USED BY JOB 1 OF JOB NET B PRESSES A BAND OF A LOGICAL CHANNEL USED BY JOB 2 OF JOB NET A.

FIG.19

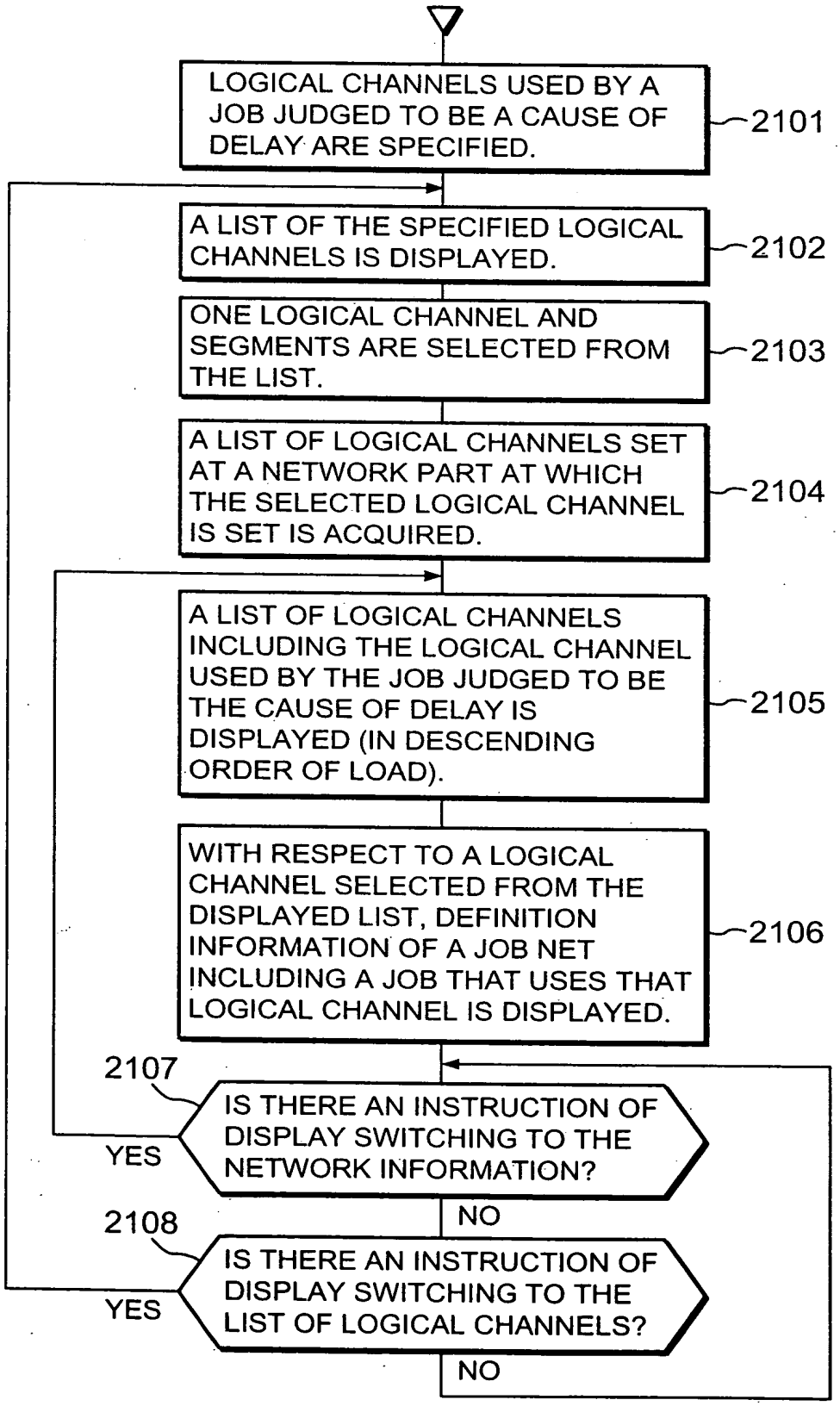

LOGICAL CHANNELS USED BY A JOB JUDGED TO BE A CAUSE OF DELAY ARE SPECIFIED.
2101
A LIST OF THE SPECIFIED LOGICAL CHANNELS IS DISPLAYED.
2102
ONE LOGICAL CHANNEL AND SEGMENTS ARE SELECTED FROM THE LIST.
2103
A LIST OF LOGICAL CHANNELS SET AT A NETWORK PART AT WHICH THE SELECTED LOGICAL CHANNEL IS SET IS ACQUIRED.
2104
A LIST OF LOGICAL CHANNELS INCLUDING THE LOGICAL CHANNEL USED BY THE JOB JUDGED TO BE THE CAUSE OF DELAY IS DISPLAYED (IN DESCENDING ORDER OF LOAD).
2105
WITH RESPECT TO A LOGICAL CHANNEL SELECTED FROM THE DISPLAYED LIST, DEFINITION INFORMATION OF A JOB NET INCLUDING A JOB THAT USES THAT LOGICAL CHANNEL IS DISPLAYED.
2106
2107
IS THERE AN INSTRUCTION OF DISPLAY SWITCHING TO THE NETWORK INFORMATION?
YES
NO
2108
IS THERE AN INSTRUCTION OF DISPLAY SWITCHING TO THE LIST OF LOGICAL CHANNELS?
YES
NO

FIG.20

JOB NET/JOB NAMES: JOB NET A/JOB 2

LOGICAL CHANNEL NAME	SOURCE - DESTINATION	NETWORK NAME
2001-4000	COMPUTER B - COMPUTER C	SEGMENT A
3001-4005	COMPUTER B - COMPUTER F	SEGMENT B

FIG.21

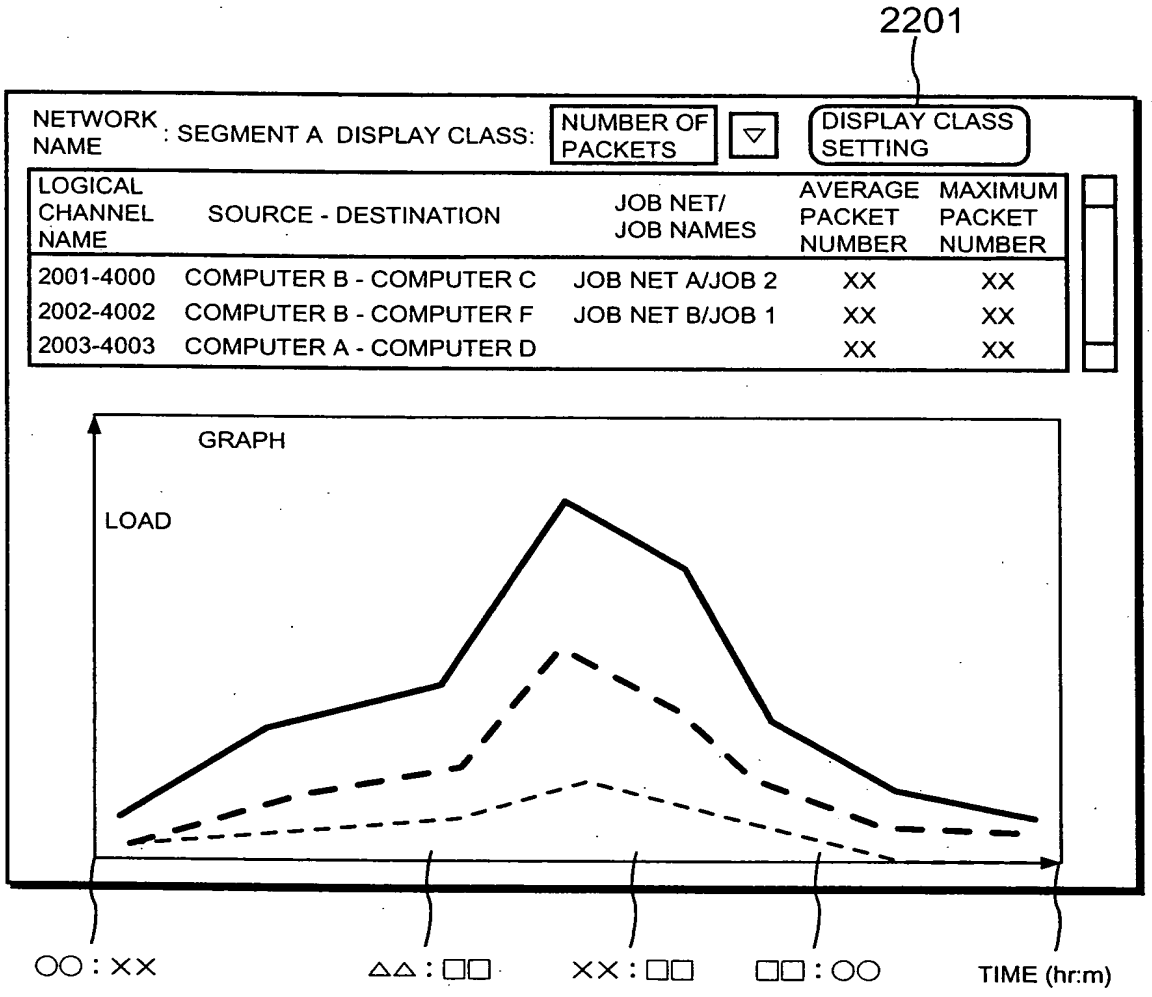

2201
NETWORK NAME
: SEGMENT A DISPLAY CLASS:
NUMBER OF PACKETS
DISPLAY CLASS SETTING
LOGICAL CHANNEL NAME
SOURCE - DESTINATION
JOB NET/ JOB NAMES
AVERAGE PACKET NUMBER
MAXIMUM PACKET NUMBER
2001-4000 COMPUTER B - COMPUTER C JOB NET A/JOB 2 XX XX
2002-4002 COMPUTER B - COMPUTER F JOB NET B/JOB 1 XX XX
2003-4003 COMPUTER A - COMPUTER D XX XX
GRAPH
LOAD
○○ : ××
△△ : □□
×× : □□
□□ : ○○
TIME (hr:m)
: WHOLE
: JOB NET A/JOB 2
: JOB NET B/JOB 1

FIG.22

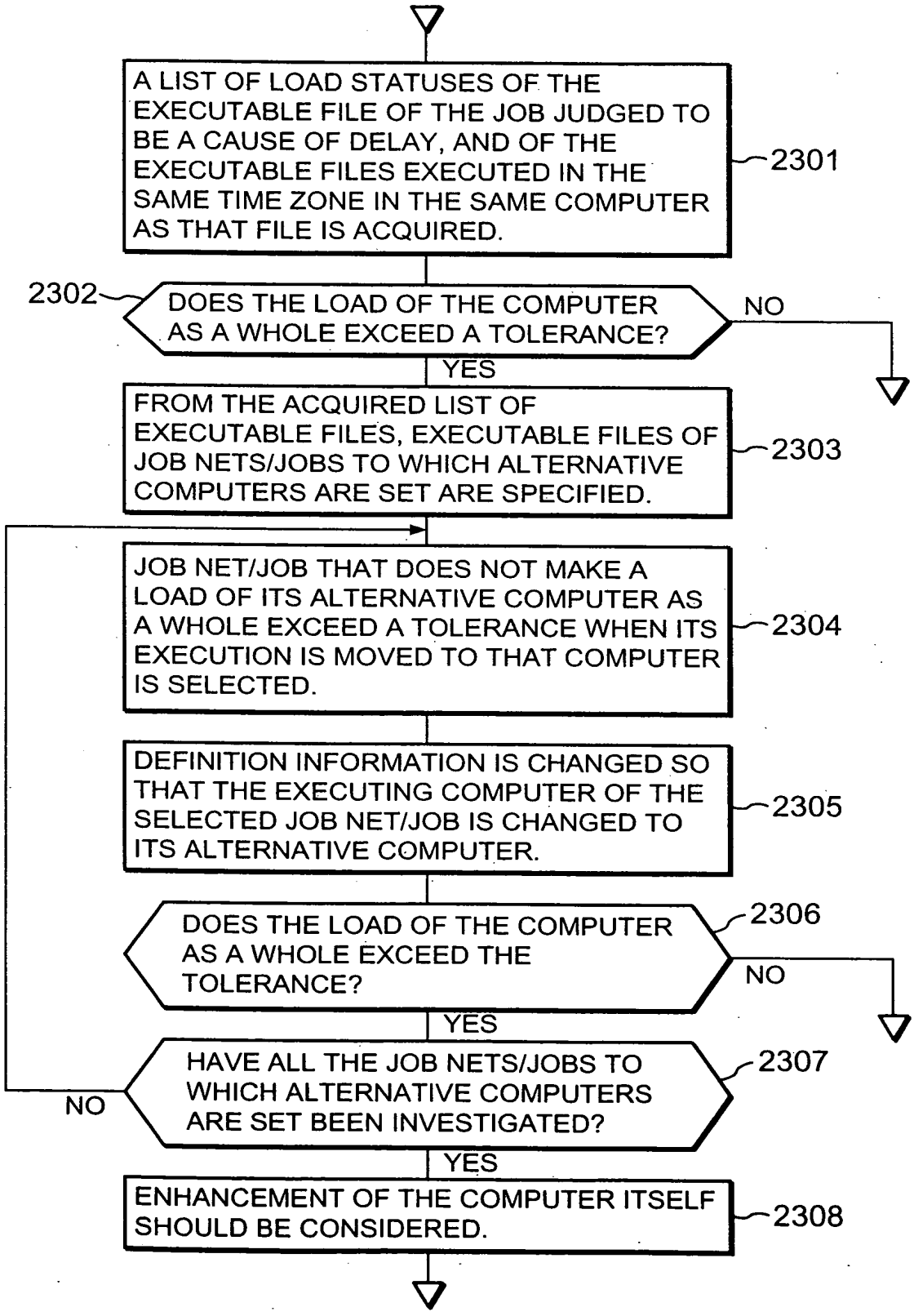

A LIST OF LOAD STATUSES OF THE EXECUTABLE FILE OF THE JOB JUDGED TO BE A CAUSE OF DELAY, AND OF THE EXECUTABLE FILES EXECUTED IN THE SAME TIME ZONE IN THE SAME COMPUTER AS THAT FILE IS ACQUIRED.
2301
2302
DOES THE LOAD OF THE COMPUTER AS A WHOLE EXCEED A TOLERANCE?
NO
YES
FROM THE ACQUIRED LIST OF EXECUTABLE FILES, EXECUTABLE FILES OF JOB NETS/JOBS TO WHICH ALTERNATIVE COMPUTERS ARE SET ARE SPECIFIED.
2303
JOB NET/JOB THAT DOES NOT MAKE A LOAD OF ITS ALTERNATIVE COMPUTER AS A WHOLE EXCEED A TOLERANCE WHEN ITS EXECUTION IS MOVED TO THAT COMPUTER IS SELECTED.
2304
DEFINITION INFORMATION IS CHANGED SO THAT THE EXECUTING COMPUTER OF THE SELECTED JOB NET/JOB IS CHANGED TO ITS ALTERNATIVE COMPUTER.
2305
DOES THE LOAD OF THE COMPUTER AS A WHOLE EXCEED THE TOLERANCE?
2306
NO
YES
HAVE ALL THE JOB NETS/JOBS TO WHICH ALTERNATIVE COMPUTERS ARE SET BEEN INVESTIGATED?
2307
NO
YES
ENHANCEMENT OF THE COMPUTER ITSELF SHOULD BE CONSIDERED.
2308

FIG.23

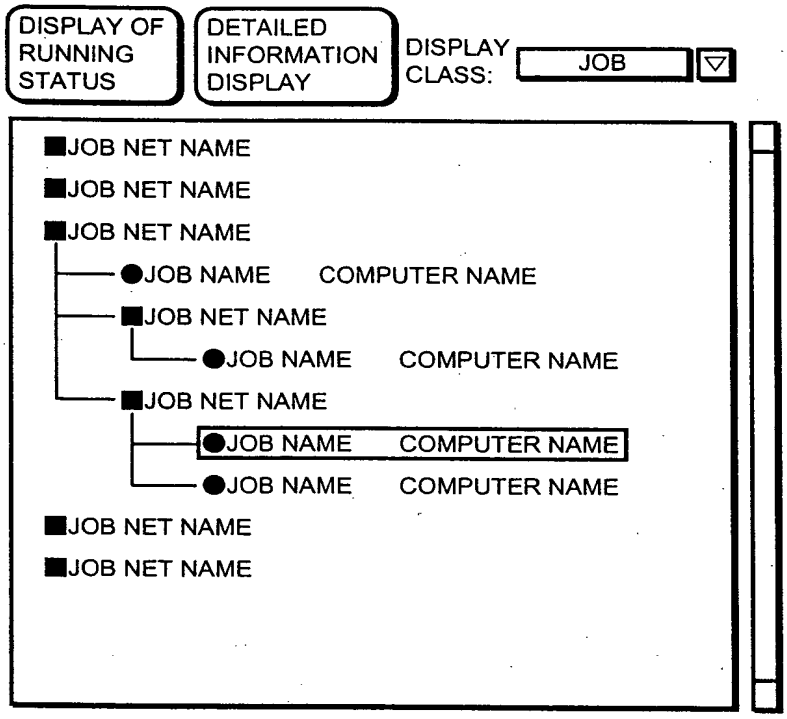
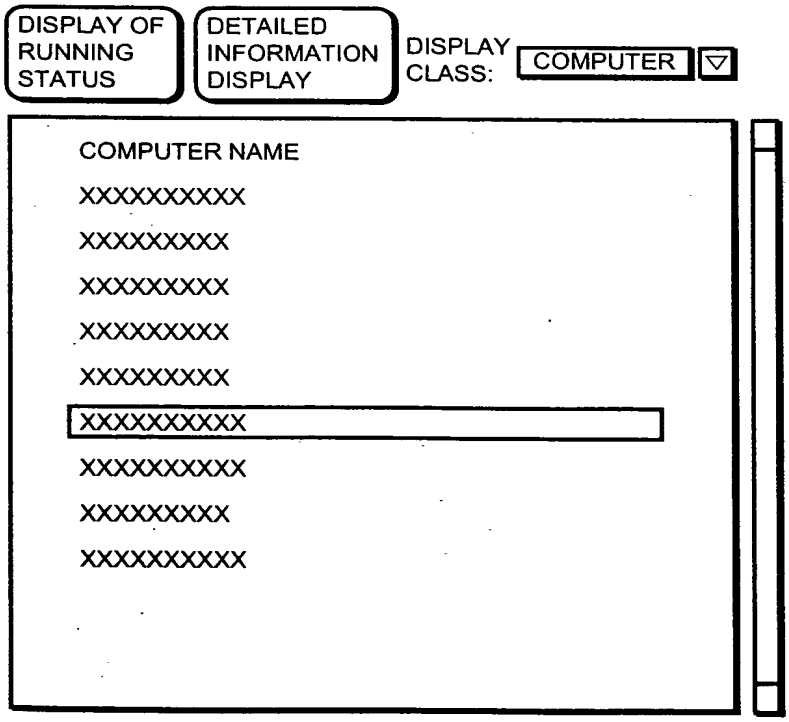

DISPLAY OF RUNNING STATUS
DETAILED INFORMATION DISPLAY
DISPLAY CLASS:
JOB
JOB NET NAME
JOB NET NAME
JOB NET NAME
JOB NAME COMPUTER NAME
JOB NET NAME
JOB NAME COMPUTER NAME
JOB NET NAME
JOB NAME COMPUTER NAME
JOB NAME COMPUTER NAME
JOB NET NAME
JOB NET NAME

FIG.24


DISPLAY OF RUNNING STATUS
DETAILED INFORMATION DISPLAY
DISPLAY CLASS:
COMPUTER
COMPUTER NAME
XXXXXXXXXX
XXXXXXXXX
XXXXXXXXX
XXXXXXXXX
XXXXXXXXX
XXXXXXXXX
XXXXXXXXX
XXXXXXXXX
XXXXXXXXXX